

EFFECTS OF THYMOQUINONE ON GENE EXPRESSION OF ABCG2 AND CANCER STEM CELL MARKERS IN MCF7 AND HEK293 CELLS

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ABSTRACT

ABCG2 gene encodes a membrane transporter belonging to the ATP-binding cassette (ABC) superfamily of membrane transporters. It is a 72-kDa protein and it is normally expressed in placental trophoblast cells and also some other cells, especially epithelial cells. It has been shown that ABCG2 plays a significant role in the absorption, distribution, and elimination of substrates such as xenobiotics and chemotherapeutics. In this respect, it determines multidrug resistance of cells to some agents against to cancer. After recognizing the development of resistance to drugs, studies on the use of non-drug compounds as chemotherapeutics have increased. Thymoquinone is one of these compounds and it is the main content of *Nigella sativa* seed oil. The anti-oxidant, anti-inflammatory and anti-cancer effects of Thymoquinone have been reported. In some studies conducted on breast cancer cell line; MCF7, it has shown that Thymoquinone decreases the proliferation of these cells. In nomenclature, one of the names of ABCG2 was breast cancer resistance protein (BCRP). As known, cancer stem cells also have resistance to chemotherapeutics and the main reason for this issue is unknown. In this study, we aimed to determine the gene expression levels of ABCG2 gene and stem cell markers such as Sox2 and Nanog gene after the Thymoquinone administration to determine the effect of Thymoquinone on cancer stem cells. The effect of Thymoquinone administration on non-tumor cells determined by calculating the same gene expression in human embryonic kidney cells (HEK293). Our results showed that Thymoquinone administration increased ABCG2 gene expression significantly both in MCF7 cells and HEK293 cells. In terms of stem cell markers, we observed a slight increase in gene expressions of Sox2 and Nanog genes. These results indicate that Thymoquinone may have a potential role in treatment option in breast cancers.

Keywords: Thymoquinone, Cancer Stem Cells, Abcg2, Sox2, Nanog